Today:

- Note: Mid-Unit Test on Thursday
  (Sections 7.1, 7.2, 7.3, 7.4)

- Begin Section 7.4
- Notes/Examples/Practice Questions

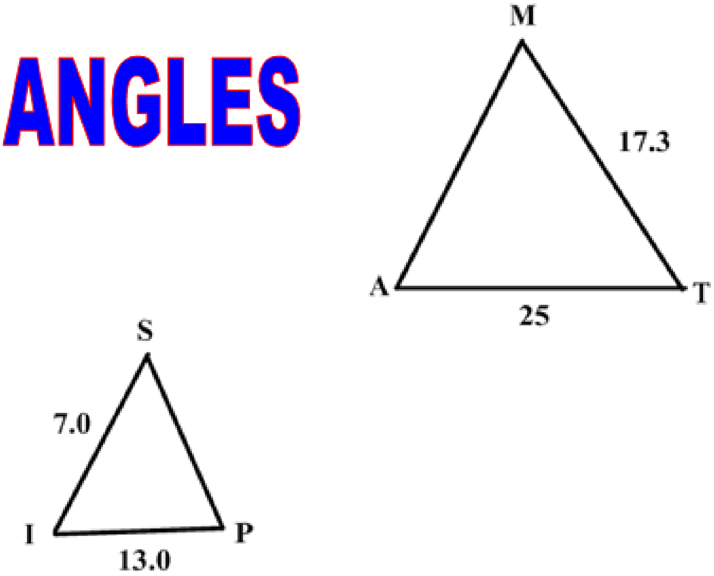
Chapter 7 Mid-Unit Test:

- Covers material from sections 7.1 to 7.4
- Terminology
- Similar Polygons
- Enlargements and Reductions
- Similar Trianlges
- Practice Test can be found on Pg.352

Assignment: Pg.352 #1,3,4,5,7

Section 7.4

SIMILAR TRIANGLES



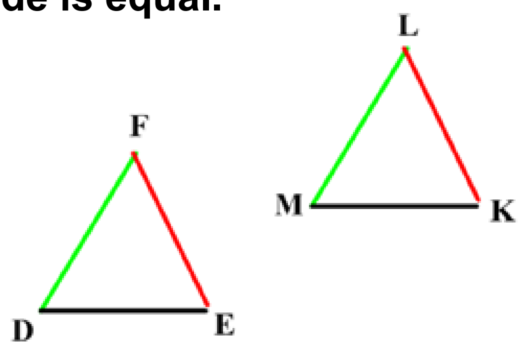
SIMILAR TRIANGLES

- Similar is a mathematical word meaning the same shape.

- We say that two triangles , triangle FDE and triangle LMK, are similar if the ratio of each side is equal.

$\Delta FDE \sim \Delta LMK$

$$\frac{FD}{LM} = \frac{DE}{MK} = \frac{EF}{KL}$$

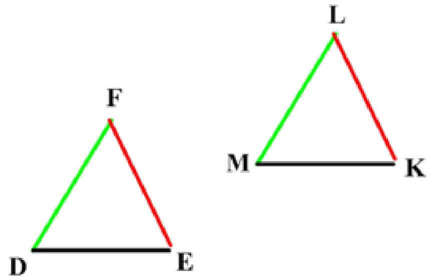


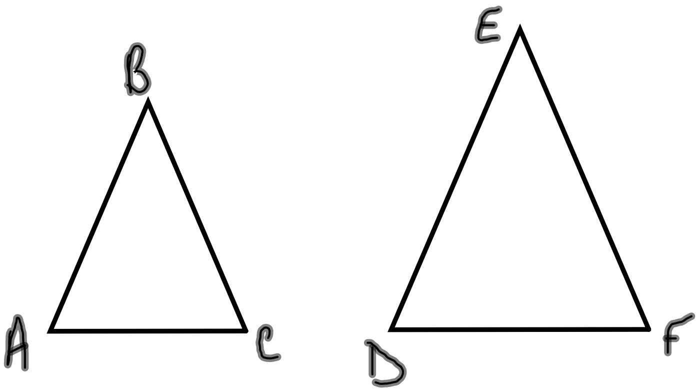
$\Delta ACM \sim \Delta DBN$

SIMILAR TRIANGLES

$$\frac{FD}{LM} = \frac{DE}{MK} = \frac{EF}{KL} \longrightarrow$$ **Corresponding sides are equal**

> NOTE:
> All sides of one triangle must be either all in the numerator or denominator.





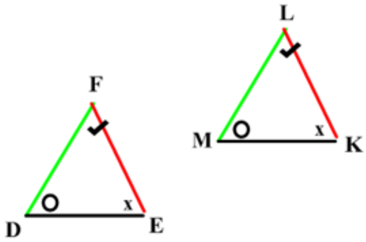
$\Delta ABC \sim \Delta DEF$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

SIMILAR TRIANGLES

In similar triangles, corresponding angles are equal.

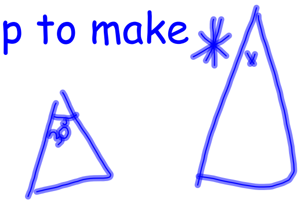
- F = ∠ L
- D = ∠ M
- E = ∠ K



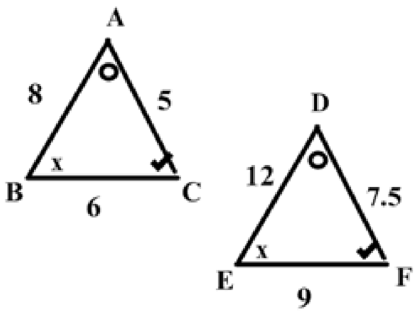
IMPORTANT:
If you know two triangles are similar, then their *corresponding angles are equal*.

Conversely, if two triangles have equal corresponding angles, then the triangles are similar.

The 3 angles in a triangle add up to make 180 degrees



EXAMPLE 1 Prove the two triangles are similar:



$\Delta ABC \sim \Delta DEF$

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$

$\frac{8}{12} = \frac{6}{9} = \frac{5}{7.5}$

$0.67 = 0.67 = 0.67$

SOLUTION:

Angles:
- ∠A = ∠D
- ∠B = ∠E
- ∠C = ∠F

Sides:

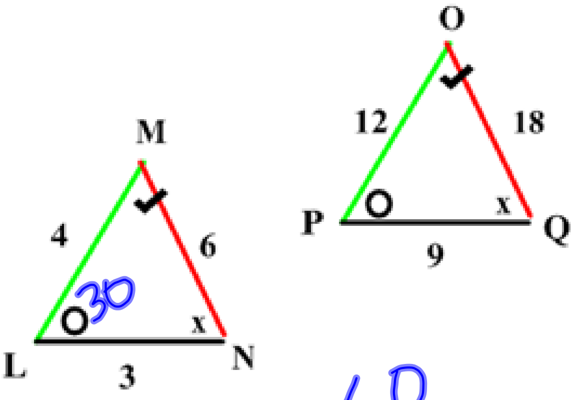
$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

$\frac{8}{12} = \frac{6}{9} = \frac{5}{7.5}$

$\frac{540}{810} = \frac{540}{810} = \frac{540}{810}$

Since corresponding angles are equal, then corresponding sides are equal. Therefore the two triangles are similar.

YOU TRY! Prove the two triangles are similar?



$\angle M = \angle O$
$\angle L = \angle P$
$\angle N = \angle Q$

SOLUTION:

Angles:

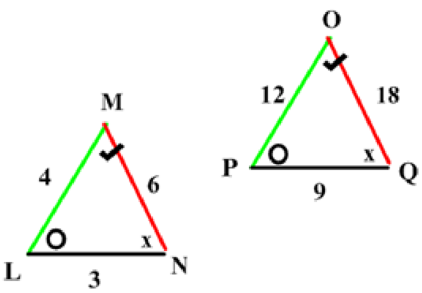
Sides:

$$\frac{ML}{OP} = \frac{LN}{PQ} = \frac{NM}{QO}$$

$$\frac{4}{12} = \frac{3}{9} = \frac{6}{18}$$

$$0.\overline{3} = 0.\overline{3} = 0.\overline{3}$$

SOLUTION Prove the two triangles are similar?



SOLUTION:

Angles:

- M = ∠O
- L = ∠P
- N = ∠Q

Sides:

$$\frac{ML}{OP} = \frac{MN}{OQ} = \frac{LN}{PQ}$$

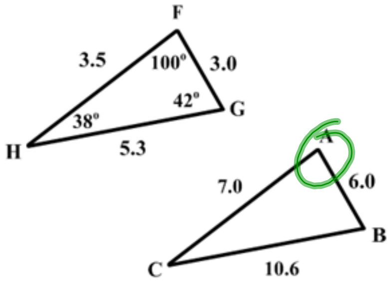
$$\frac{4}{12} = \frac{6}{18} = \frac{3}{9}$$

$$\frac{12}{36} = \frac{12}{36} = \frac{12}{36}$$

Since corresponding angles are equal, then corresponding sides are equal. Therefore the two triangles are similar.

EXAMPLE 2

Find the measures of ∠A, ∠B, ∠C.



SOLUTION:

Since the ratios of the sides are all equal, the triangles are similar, that also means the corresponding angles are equal.

Sides:

$$\frac{FH}{AC} = \frac{FG}{AB} = \frac{GH}{BC}$$

$$\frac{3.5}{7} = \frac{3}{6} = \frac{5.3}{10.6}$$

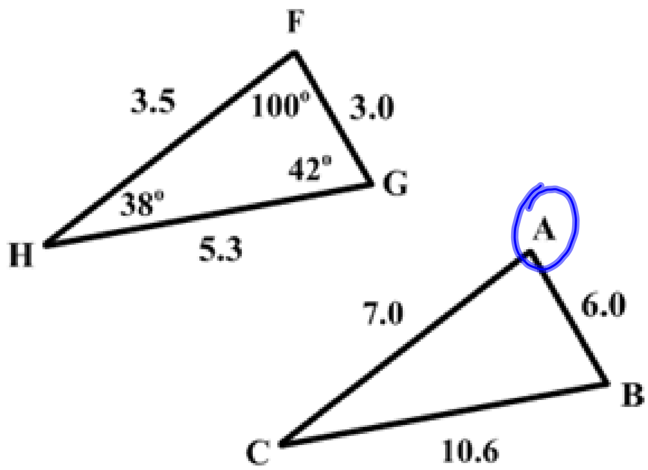
$$\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$$

Therefore: ∠F = ∠A
∠H = ∠C
∠G = ∠B

- A = 100°
- C = 38°
- B = 42°

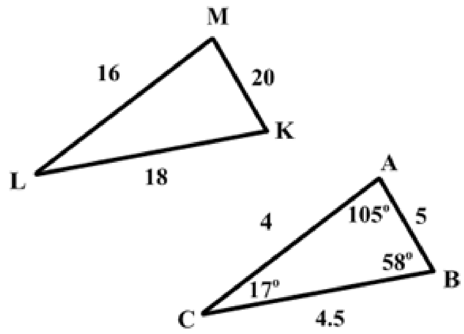
EXAMPLE 2

Find the measures of ∠A, ∠B, ∠C.



∠A = 100°
∠B = 42°
∠C = 38°

YOU TRY! Find the measures of ∠ M, ∠ L, ∠ K.

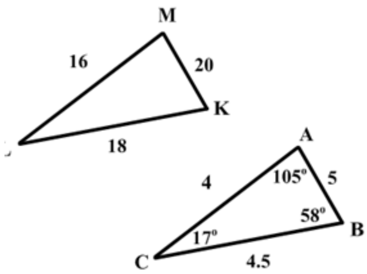


SOLUTION:

Sides:

SOLUTION

Find the measures of ∠ M, ∠ L, ∠ K.



SOLUTION:

Since the ratios of the sides are all equal, the triangles are similar, that also means the corresponding angles are equal.

Sides:

$$\frac{ML}{AB} = \frac{MK}{AC} = \frac{LK}{BC}$$

$$\frac{16}{4} = \frac{20}{5} = \frac{18}{4.5}$$

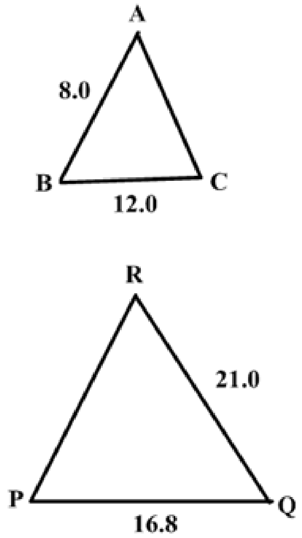
$$4 = 4 = 4$$

Therefore: ∠ M = ∠ A
∠ L = ∠ B
∠ K = ∠ C

- M = 105^o
- L = 17^o
- K = 58^o

EXAMPLE 3

Triangle ABC is similar to Triangle RPQ. Find the lengths of RP and AC



SOLUTION:

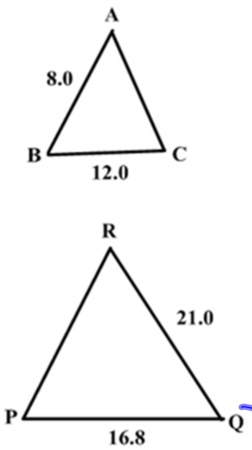
Sides:

$$\frac{8}{x} = \frac{12}{16.8} = \frac{y}{21}$$

$\frac{8}{x} = \frac{12}{16.8}$	$\frac{12}{16.8} = \frac{y}{21}$
$12x = 8(16.8)$	$16.8y = 12(21)$
$x = \frac{134.4}{12}$	$y = \frac{252}{16.8}$
RP = 11.2	**AC = 15**

EXAMPLE 3

Triangle ABC is similar to Triangle RPQ. Find the lengths of RP and AC



$\triangle ABC \sim \triangle RPQ$

$$\frac{AB}{RP} = \frac{BC}{PQ} = \frac{AC}{RQ}$$

$$\frac{8.0}{RP} = \boxed{\frac{12.0}{16.8}} = \frac{AC}{21.0}$$

flip

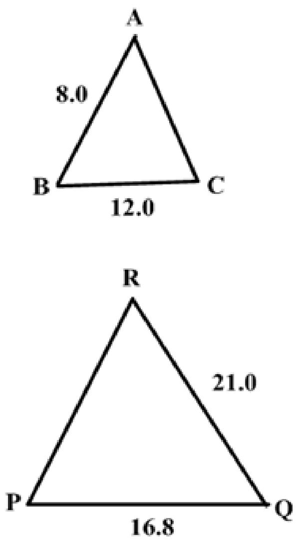
$$\cancel{8} \cdot \frac{RP}{\cancel{8.0}} = \frac{16.8}{12.0} \cdot 8 \qquad 21 \cdot \frac{12.0}{16.8} = \frac{AC}{\cancel{21.0}} \cancel{21}$$

$RP = 11.2$

$AC = 14.\overline{9}$

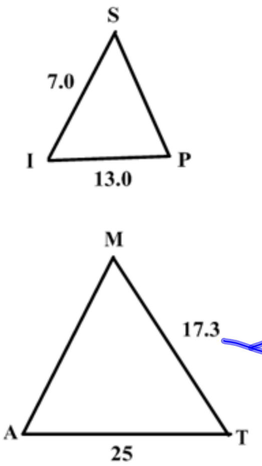
$AC = 15.0$

Triangle ABC is similar to Triangle RPQ. Find the lengths of RP and AC



YOU TRY!

Triangle SIP is similar to Triangle MAT. Find the lengths of MA and SP



SOLUTION:

Sides: $\triangle SIP \sim \triangle MAT$

$$\frac{SI}{MA} = \frac{IP}{AT} = \frac{SP}{MT}$$

$$\frac{7.0}{MA} = \boxed{\frac{13.0}{25}} = \frac{SP}{17.3}$$

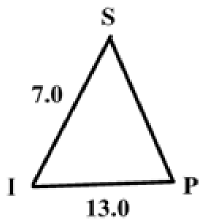
$$7 \cdot \frac{MA}{7} = \frac{25}{13} \cdot 7 \qquad 17.3 \cdot \frac{13.0}{25} = \frac{SP}{\cancel{17.3}} \cdot \cancel{17.3}$$

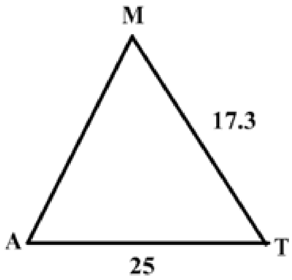
$MA = 13.5$ $SP = 9.0$

$13.4\underline{6}1$ 8.9996

SOLUTION

Triangle SIP is similar to Triangle MAT. Find the lengths of MA and SP





SOLUTION:

Sides:

$$\frac{SI}{MA} = \frac{SP}{MT} = \frac{IP}{AT}$$

$$\frac{7}{x} = \frac{y}{17.3} = \frac{13}{25}$$

$$\frac{7}{x} = \frac{13}{25}$$

$13x = 7(25)$

$x = \frac{175}{13}$

MA = 13.5

$$\frac{13}{25} = \frac{y}{17.3}$$

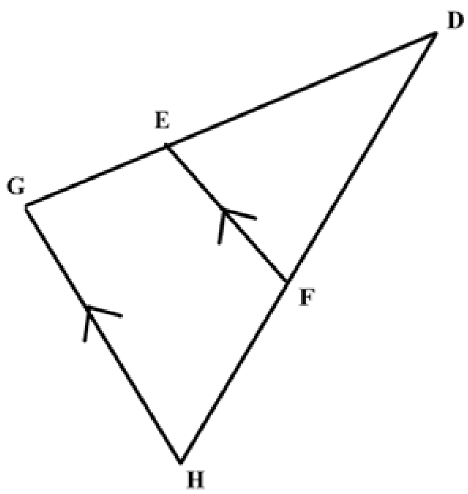
$25y = 13(17.3)$

$y = \frac{224.9}{25}$

SP = 9

EXAMPLE 4

For the figure below, show that Triangle DEF is similar to Triangle DGH.



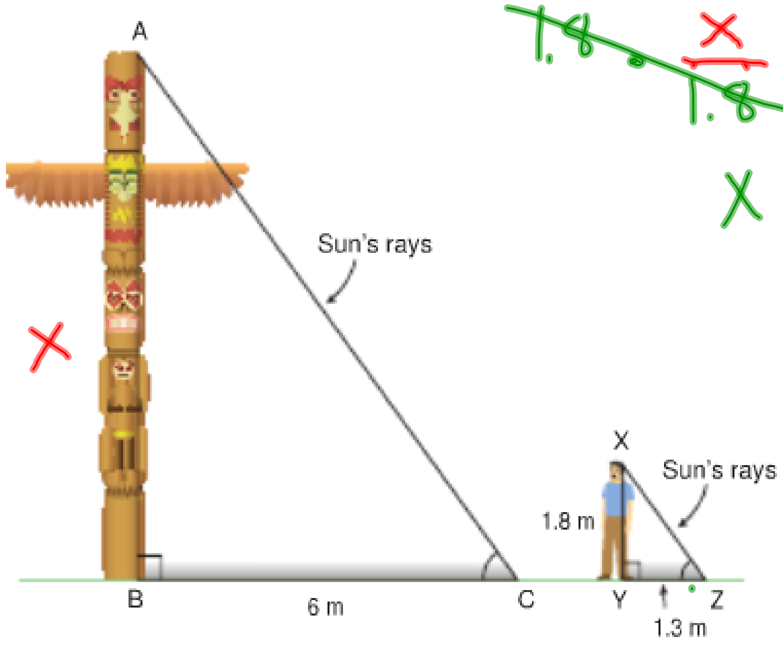
SOLUTION:

If two triangles have equal corresponding angles, then the triangles are similar.

Therefore:

- D = $\angle$ D (common angle)
- E = $\angle$ G (Corresponding angles)
- F = $\angle$ H (corresponding angles)

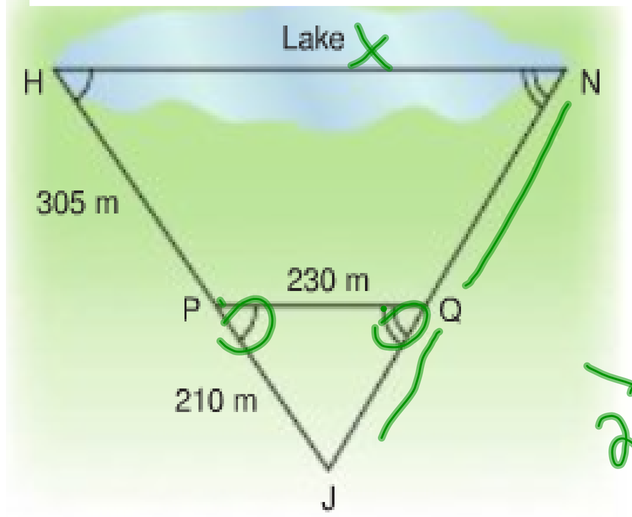
Therefore:
Triangle DEF is similar to Triangle DGH.



$\cancel{1.8} \cdot \frac{x}{\cancel{1.8}} = \frac{6}{1.3} \cdot 1.8$

$x = 8.3m$

How can the surveyor determine the length HN to the nearest metre?



$\Delta HNJ \sim \Delta PQJ$

$\frac{HN}{PQ} = \cancel{\frac{NJ}{QJ}} = \frac{HJ}{PJ}$

$\cancel{230} \cdot \frac{HN}{\cancel{230}} = \frac{515}{210} \cdot 230$

HN= [illegible] m

564 m

Class work

Questions Pg.349-351

#4-7, 9-15

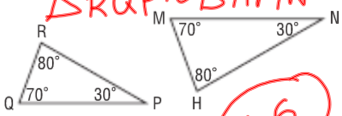
Pg. 349
#4-7

See examples in notes or
Pg.345-348 for extra help

4. Which triangles in each pair are similar?
How do you know?

$\triangle RQP \sim \triangle HMN$

a)



$\triangle QRP \sim \triangle MHN$

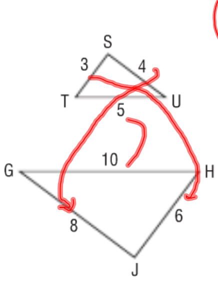
$\angle Q = \angle M = 70°$

$\angle R = \angle H = 80°$

$\angle P = \angle N = 30°$

4, 5

b)

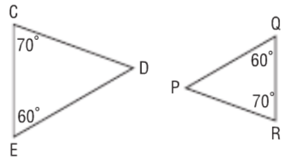


$\triangle STU \sim \triangle JHG$

$\frac{10}{5} = \frac{6}{3} = \frac{8}{4}$

$2 = 2 = 2$

c)



d)